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Commercial Technical Education.

AN ADDRESS DELIVERED BY

CHARLES A. COLTON, E. M.

DIRECTOR OF THE
NEWARK TECHNICAL SCHOOL,

BY REQUEST OF THE BOARD OF TRADE,

NOVEMBER 10, 1897.

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Commercial Technical Education.

If in 1865 a person had raised the question as to England's ability to maintain industrial leadership among the nations, his doubt would have been considered as pessimistic to say the least, if his sanity had not been called in question. Yet no one can read the discussions carried on in the current periodicals in reference to the continental competition in England, without realization that the other European Powers have made advances and that this competition has become so serious as to cause alarm. Germany seems to be the greatest rival of England in this respect and the result of the discussion seems to be, that the cause of Germany's rapid strides is due to technical and industrial education. In England considerable attention has been devoted to art and its applications, the results being shown in improvement in the finish of textile fabrics, and the excellence of ceramics. Science instruction however, did not receive the same impetus, and in the meantime Germany had by government aid followed up pure science with great zeal, and every new discovery in the laboratory has immediately been tested for its practical application. The consequence is that not only in England but in Newark, we see many of our purchases stamped with the tell-tale mark "Made in Germany."

Quite a sensation has been created in England by the publication of a little book having for its title this trade mark. The substance of the book is, that the idea that Englishmen still monopolize the trade of the world is a delusion, and that Germany is not only beating England in foreign markets, but in the home market also; as is evidenced by the flooding of the latter with goods bearing the mark "Made in Germany."

The success is attributed first, to the educational system, and second to the superiority of her consular system. Bearing on the first question I quote from "Shaw's Municipal Government."

"The German cities have been trying to make their school systems fit the necessities of their population. Having amply provided for elementary and higher education, they have in addition shown a preference for schools which will furnish Germany with an abundant supply of men of special and technical training.

Manufacturing cities like Chemnitz, promote the development of their principal industries by providing trade schools which are adapted in their courses to the industrial character of the city and vicinity."

In a recent address delivered before the Birmingham, England, Technical School, the speaker referred to the growth of the color trade in Germany. That industry was really an English discovery, but it has been exploited by the Germans to such a degree that they virtually control the trade. One of Bismarck's best aphorisms was, "The nation that has the best schools has the future."

DIFFERENCE BETWEEN GENERAL EDUCATION AND TECHNICAL EDUCATION.

The distinction between general and technical education even at the present time is not clearly understood. In the former, the scholar learns how to acquire knowledge; in the latter, how to apply it to practical use. The difference is not so much in the subject taught, as in the method and object of the course of study. If Spanish is taught with the idea that the student can be enabled to carry on business in Spanish countries, it is a subject of technical instruction. If the idea is to enable the student to read and appreciate Spanish literature, that is general education.

Technical education should not supplant general education, but supplement it. There seems to be a mistaken idea on the part of some persons as to the proper place in life of technical education; many advocating the use of the years of childhood which should be devoted to general education. In many instances, this beginning at the wrong end, for so it seems to me, is prompted from pecuniary motives; the fact that the man or woman should be trained before the artisan being forgotten. The aim of general education should be the good of the country and the elevation of the social condition of the people. The

aim of technical education should be improvement in workmanship and the advancement of the different industries.

The instruction in the technical school may not in every instance be of direct benefit in each student's occupation, though indirectly it has been found to be so in most cases.

If Germany, Switzerland, France and England find technical education so valuable, is it not reasonable to suppose that the American with his intelligence, adaptability and inventive genius will find vast benefits accruing from its establishment on a more thorough basis than has been attempted?

RECENT ADVANCES IN TECHNICAL EDUCATION.

In Switzerland there are trade schools for every industry and often for different branches of the same industry. At St. Gall is one of the best lace schools in the world. These schools are supported by the State; scholarships being given to deserving students.

The Birmingham, England, Technical School endeavors to provide instruction of practical value for the trades on broad lines, to all sections of the community. It does not undertake to teach the practice of trades in its class rooms, but the scientific principles on which the industries are based. It is supported by State and municipal aid, and to such an extent that while a fee is attached to all courses it is extremely small. This institution is probably the most pretentious of its kind in Great Britain; scholarships and prizes are offered by individuals and associations.

At Manchester, England, a school for Commercial Technical Education is about completed. A report from the committee sent to Germany and Austria to visit technical schools has come to hand and a resumé of it is well worth attention.

The substance of the report contained in "Engineering" is as follows: In Germany the schools are instituted mainly for advanced work, the day students being comparatively few in number.

At Crefeld, the large dyeing and finishing school is intended to accommodate but forty-five day students. For their instruction there is a staff consisting of a director, three assistant lecturers, a special chemist for dyeing, and masters for dyeing and finishing."

"In Germany the committee report that the course of study is extraordinarily thorough; students often remaining at the school five or six years. The equipment is so complete that in those schools relating to the textile trades, the work is done on a commercial scale."

"At Aix la Chapelle, the technical school is devoted to worsted and woolen spinning and weaving. There are but sixty students."

"In Darmstadt, a city of but 57,000 inhabitants, there is a Technical High School which has been erected at a cost of \$650,000."

In all the cities visited by the members of the committee, they report large expenditures for buildings, equipments and salaries in the interest of technical education for commercial purposes, and they returned to Manchester firmly convinced that what seemed an extravagant outlay, will fall far short of the splendid equipment of the foreign schools.

Turning to our own country, it will be seen that these examples of providing the more extensive development of old industries as well as the introduction of new, by the education of persons for the business to be followed, have not gone unheeded by us, and without assuming to ourselves the ability to control trade solely by reason of our great resources as a nation, the solution of the problem has already been undertaken by the establishment in different parts of the country of schools for industrial education.

Beginning with the East, we may notice first, the Industrial Institute at Springfield, Massachusetts. This is almost exclusively a trade school. New England being largely devoted to manufacturing, there is always a demand for skilled workmen, and it is to supply this demand that gives the Industrial Institute its field. This school has diverged more widely from the course of other schools following in the same line of work, by making the work on which the students are employed in learning a trade, commercial, the products being sold, or the work being done to order in open competition with shops in the same line of business. It is a day school, charging \$100 per year for tuition. It is a private corporation, receives no State or municipal aid, and the experiment is being tried of making the receipts from tuition, sale of articles and work done to

order, pay for the cost of tuition. It owns a large piece of land on which are two brick buildings, one of which is rented with power to an electrical company which adds to its income. It is operated as a business enterprise and its graduates are said to be in good demand. The courses of instruction embrace Kindergarten work, elementary engineering and normal instruction, and the following trades: machinist, pattern-making, printing, plumbing, blacksmithing, brick-laying, plastering, carpentry and joinery. An opportunity is given the student to learn the trade he may choose in all its branches.

The Rhode Island School of Design, at Providence, R. I., provides instruction to artisans in drawing, painting, modeling and designing, that the principles of art may be applied to the requirements of trade and manufacture. It has a large art gallery, owns some works of art and has loan exhibitions from time to time. The art gallery is open free to the public. Instruction is given both day and evening, and a tuition fee is charged. It is supported mainly by private subscriptions, the City and State contributing but a small amount. The manufacturers of Rhode Island find it difficult to obtain designers trained in this country, and this school is expected to supply the demand. It is well equipped for the work, and seems to be well supported.

The Philadelphia Textile School at the present time represents the most important effort made in America to teach art in direct application to the actual needs of an industry. The course of study is the result of fifteen years experience, and includes instruction in the manufacture of cotton, woolen and silk fabrics. It covers three years of work in fabric structure, fabric analysis and calculations, color harmony and principles of figured design, mechanical drawing, chemistry of dyeing, carding, spinning and weaving. The management of the school maintains that industrial designers cannot be trained apart from the industries themselves. Philadelphia having a large textile industry, it is just the place to locate a textile school.

Most of the students have had one or two years' experience in working in the mills. The fees vary from \$10 to \$150 for a year's tuition.

The textile manufacturers of Lowell and vicinity having awakened to the fact that something must be done to improve

the finer grade of their products, and the processes concerned in their manufacture, proposed in 1891 to establish a textile school. The success of the Philadelphia Textile School confirmed the decision of the Lowell gentlemen, that American conditions favored the establishment of such a school. Foreign schools of this kind were carefully studied and on February 1st, 1897, the Lowell Textile School was opened to students.

To start the school, the city gave \$25,000 and the manufacturing companies of the city gave \$50,000. It receives city and state aid, and charges a tuition fee of \$100 per year for day students.

The school is equipped with machinery to the value of \$50,000 of the highest grade used in textile mills, some of it being specially built for experimental work. It is thoroughly practical in its character and is a trade school in every sense of the term. It is designed to give instruction in the textile industries, in science and art as applied to these industries, and in the processes and methods for the purpose of improving any special trade, or of introducing new branches of industry. To afford mill operatives an opportunity to perfect themselves in the branches in which they work, evening classes giving a technical education are to be organized.

Free popular lectures on the textile industries are to be given at stated intervals throughout the year. In addition to these, courses of five to ten lectures are to be organized on special subjects connected with the textile industries.

A textile school has been talked of in Providence, Rhode Island, one gentleman offering to give \$20,000 for its establishment, stating that the foundation of his fortune was laid in the textile schools of England.

It is announced that the Trustees of the Augusta, Ga., free school are considering the advisability of equipping a school for instruction in textile manufacture, the manipulation of textile machinery, and the making of designs for carpets and prints.

The Cincinnati Technical School is a private corporation, organized to give instruction and practice in the use of tools, mechanical and free-hand drawing, mathematics, English language, and the natural sciences; to develop skill in handicraft, and to impart such a knowledge of essential mechanical principles as will facilitate progress in the acquirements of

manual trades. The charges for tuition vary from \$50 to \$125 per year.

The Armour Institute of Chicago, Ill., founded by the munificence of P. D. Armour, is a manual training and trade school.

The last school of this kind to open its doors in Chicago is the Lewis Institute, which is designed to give an advanced High School course, and a partial collegiate course with manual training, having an endowment of \$1,600,000, it certainly ought to be able to do excellent work with moderate charges to the students.

The buildings cost \$230,000 without furnishing or equipment. All students pay tuition fees, and there are day and evening classes.

A special department of household science for women is a feature of the institute, in which instruction is given in cooking and food study, food analysis, and the application to household affairs of the principles of physics, chemistry and biology.

The most pretentious undertaking in the line of industrial education is Pratt Institute, Brooklyn. Its object is "to promote manual and industrial education as well as cultivation in literature, science and art; to inculcate habits of industry and thrift, and to foster all that makes for right living and good citizenship."

The work of the Institute is carried on along the following lines, viz.: Educational, normal, technical and special. Its equipment is of the best. It has day and evening classes; the charges for tuition being very moderate. The income from tuition fees does not pay one-third of running the school. It has an endowment of \$3,500,000, and is able to offer advantages in its lines of work which no other institution in this country has yet surpassed, and has furnished instructors for schools all over the land.

It is an excellent example of what can be done through private benefactions; the management of the trust having been very judiciously administered by the children of the founder.

Modeled after it are Drexel Institute, of Philadelphia, and Armour Institute, of Chicago.

We are all hoping for and expecting the opening of an industrial era which shall put us as a nation in the van of others, and

our great desire is to obtain and hold the monopoly of the home market. To do this the people should be offered the best goods for their money. We are not indifferent to foreign trade, but very much desire to obtain it, as has been indicated in several ways recently. It is possible that by a tariff we may be able to keep German goods out of our own market, but to sell to our neighbors in South America, we must send them what they want and a superior article. With regard to our own market it makes very little difference how high the tariff is put on some goods, the importation of the products of foreign skill and taste cannot be shut out by any such device. There is but one way to prevent it and that is to have our own trained workmen for the highest branches of an industry, and the United States can very well profit by the example of Germany, and establish and improve her technical schools and also her consular service.

An intelligent Frenchman is stated to have made this claim: "The best instructed industry is at present the strongest." There is no doubt but that Germany is intensely in love with industrialism. Newark is an active centre of an industrial area which includes Union, Hudson and Passaic counties as well as Essex. With the trolley facilities now provided and to be extended, there is not a question of doubt but that the Technical School of Newark will receive a large number of students from all the places which are so easy of access. There are now in attendance three students from Passaic, one from Nutley, two from Bloomfield, one from Orange, one from Irvington, one from Elizabeth, one from Roselle, and one from Kearny.

In addition to these, students are in attendance who are employed by the Singer Manufacturing Company, at Elizabethport, but reside in Newark.

To provide the training in the industries represented in this area will require money. It should not be a question of what is to be done in the way of economy, for economy is often as unwise as extravagance, but what shall be done in the way of education.

If the city and state are to retain their high place in the industrial world, skilled education must be provided for. There was a time when the scientifically educated man was not wanted in practical life, but all that is changed, and industrial establishments are seeking just that kind of talent and it is

quite the custom to ask of an applicant for a position, what has been his school training. Certain schools have acquired such an enviable reputation by reason of the achievements of their graduates, that a diploma from them is a satisfactory guarantee to many employers of such talent as to the fitness of the holder for the position.

Business men no longer decry theoretical education, and where the theoretical and practical are combined as in a technical school, the majority of the students are found to be well equipped, not only to earn their living, but to improve the industries in which they are engaged.

Look at the effect of education on invention. It will be found that many of the most successful inventors of the present time are scientifically educated men. While it is not expected nor pretended that everyone must be technically educated, the most advanced industries call for superintendents and foremen who have been thus trained, and no one will deny that many of our industries have made but little advance in a quarter of a century.

At the last session of the legislature, the Trustees of the Technical School endeavored to have the law under which it is organized, amended so as to increase its appropriation. The measure met with defeat in the Senate. The reasons given were, that the Technical School of Newark was a local institution and Newark should take care of it; that the State could not afford to give any more money to it, when other localities were not able to have such a school. As there are no restrictions with reference to the place of residence of a student, and it has already been demonstrated that students will attend from other localities, the claim that it is a local institution does not hold good. As for unfairness to other portions of the State in the event of more money being given to the Newark Technical School, please notice how the school money of the state is apportioned and see if Essex County has not done more than its share towards education in other counties.

The school tax is levied according to the number of pupils, the amount being equal to five dollars for each child of school age. The total sum being raised is assessed on the counties according to the tax ratables, so that a rich county like Essex helps a poor county like Cumberland. Ninety per cent of the

money received from each county is credited back to that county, the balance going to the State School fund to help the poorer counties. As much as \$50,000 per year has been taken from Essex, and even now from \$7,000 to \$10,000 is taken annually.

If the Newark Technical School is permitted to develop on the lines laid out, not only will the industries of the State be benefited, but workmen themselves will also be benefited.

This fact was recognized by many of the mill operatives in Lowell and Lawrence, Massachusetts. When the legislature of Massachusetts was asked to appropriate \$100,000 for the Lowell Textile School, it was stated that the petition came not only from mill owners, but also from overseers and skilled workmen. All recognized the necessity of improving the output of the mills, and that the manufacture of the coarser and cheaper textiles was gradually being removed nearer to the place where the raw material was grown.

To develop the Newark Technical School will require money, the amount of which will increase in proportion to its development.

The school has no endowment, and if it had, there is no certainty that this would at all times provide sufficient income for its maintenance. The income from invested capital has been gradually growing smaller, and many institutions which are dependent entirely on income from investments, have found their financial support gradually slipping away from them, and under the present condition of things it is not possible to support an industrial school on tuition fees alone.

The State must ultimately be looked to, to support all classes of schools, if all classes are to succeed. Education is becoming more costly every year, and those who have sufficient interest and breadth of views in the matter should endeavor to interest the legislature of the State, to secure from it effective and permanent support for the Newark Technical School.



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